

## Conservation and Transformation of Energy

**PS-6 The student will demonstrate an understanding of the nature, conservation, and transformation of energy.**

**PS-6.10 Compare alternating current (AC) and direct current (DC) in terms of the production of electricity and the direction of current flow.**

**Taxonomy Level:** 2.6-B Understand Conceptual Knowledge

### Key Concepts:

Alternating current (AC): Generator, Electromagnetic induction

Direct current (DC): Battery, Chemical cell

**Previous/Future knowledge:** In the 4<sup>th</sup> grade students illustrated the path of electric current in series and parallel circuits (4-5.7). In the 6<sup>th</sup> grade students explained how magnetism and electricity are interrelated by using descriptions, models, and diagrams of electromagnets, generators, and simple electrical motors (6-5.3). In Physical Science the concept of electric current is expanded. Students will understand the movement of the electric current and understand how AC and DC current are produced.

### It is essential for students to understand

- That electric current in a wire is the flow of electrons.
- *Direct current (DC):* DC current or direct current flows in one direction.
  - DC current can be produced using a solar cell or a chemical cell. A battery is a combination of chemical cells. (Strictly speaking a battery is a combination of more than one cell. Sometimes a “D cell” is referred to as a battery. This causes confusion with students.)
  - Electrons are repelled by the negative terminal of a battery and attracted to the positive terminal of a battery.
  - When a circuit is connected to the terminals the electrons will move from the negative terminal to the positive terminal.
- *Alternating current (AC):* AC current or alternating current moves back and forth.
  - The electric current that comes out of the outlets in our homes and schools is AC current.
  - AC current can be produced by a generator using the principle of *electromagnetic induction*. The current is produced when a magnet moves relative to a coil of wire.
  - In a generator the magnet (or coil) spins causing the terminals of the generator to alternate between positive and negative.
  - Electrons are repelled by the negative terminal and attracted to the positive terminal just as in DC currents.
  - Since the terminals are continually changing from positive to negative the current continually changes direction.

**It is not essential for students to know the number of times poles switch in a generator.**

### Assessment Guidelines:

The objective of this indicator is to compare AC and DC current with regard to production and current flow, therefore, the primary focus of assessment should be to show similarities and differences between DC and AC current and to understand why each type of current moves the way it does.

In addition to *compare*, students should be able to

- Exemplify AC and DC current and how each is produced;
- Classify current as either AC or DC;
- Summarize major points about AC and DC current.